Worthington was particularly good. His delightful voice and masterly style invariably held his audience up to the last moment. Occasionally he lectured to the convicts at Princetown, and twice the present writer helped him with experiments and lantern slides, the first lecture being on astronomy and the second on the dynamics of rotation. On the first occasion it did not seem possible that an audience of 1000 convicts would be entertained with such a subject as astronomy. But Worthington was in his best form, and held their attention from first to last. The second lecture was even more successful than the first, owing to the experiments.

Worthington's original work in physics is well known. He published papers on surface-tension, the stretching of liquids, the splash of a drop, and other subjects. All his work was marked by great experimental skill, especially that on the stretching of liquids and on splashes. He devoted a large amount of time to the latter subject. The apparatus used was simple, but in his skilful hands the results obtained were accurate and beautiful. Of the many hundreds of experiments made, he only published those that brought out points in a connected chain of phenomena.

He published several scientific works, the chief of which was on the "Dynamics of Rotation." Marked by great lucidity of style, this book ably filled a place in the library of physics. He also wrote and had printed a number of pamphlets on wave motion, hydraulics, statical and current electricity, and optics, for private circulation among his students. These were all most carefully prepared after much discussion with his assistants.

Worthington was a man of strong and decided character; having marked out a line of action, he stuck to it, and fought for it with all his might. In fact, he rather loved a fight, being a Lancashire man. His considered judgments were always sound, but he was impulsive at times. He ruled his department at Keyham on the principle that a headmaster should make his presence felt, and in that he succeeded; on the whole, he ruled with much wisdom, and undoubtedly the many officers who passed through his hands will recall his influence on them as entirely for their good.

To his friends and those who understood him, Prof. Worthington's death is a great loss.

PROF. JOHN WRIGHTSON.

THE death of Prof. John Wrightson, on November 30, at seventy-six years of age, removes a well-known authority and writer from the agricultural world. As professor of agriculture (1864-79) at the Royal Agricultural College, Cirencester, he formed one of a small but eminent group of teachers, including Church and Fream, who have left a lasting mark on their subject. After his departure from Cirencester he founded Downton College, of which he was president until it closed in 1906 from inability to compete with State-aided institutions. Many of his former pupils, both at Cirencester and Downton, have done much to promote the improvement of agriculture. For some years Wrightson was professor of agriculture and agricultural chemistry at the Royal College of Science, and chief examiner to the Science and Art Department in the "Principles of Agriculture."

As a writer Wrightson was distinguished by his careful selection of matter and by lucidity of style. He and Principal Newsham recently compiled a "Text-book of Agriculture" which is extremely practical in nature and has been much appreciated by many educational institutions. For many years Prof. Wrightson was agricultural editor to the *Times*, and wrote the periodical reports on crops up to the time of his death. His intimate friends, and they are many, will feel the loss of his genial personality and old-fashioned courtesy. His intellectual powers remained unimpaired by age, and his unobtrusive generosity will be remembered with gratitude by many. His name will always occupy an honoured place in the history of British agriculture, especially as regards the educational developments of which the Royal Agricultural College, the Royal Agricultural Society of England, and the Board of Agriculture (when Sir Thomas Elliott was Secretary) have been pioneers.

J. R. A.-D.

NOTES.

THE question of national laboratories of scientific research has been brought forward recently in France. In the *Comptes rendus* of the Academy of Sciences for November 13 is a preliminary report by a committee composed of MM. Jordan, Lippmann, Emile Picard, d'Arsonval, Haller, A. Lacroix, Tisserand, and Le Chatelier on this question. It is pointed out that all the great industrial nations possess national laboratories of scientific research, systematically directed towards the study of technical problems. The National Physical Laboratory in England, the Bureau of Standards and the Carnegie Institution in the United States, the Physikälische Reichsanstalt and the institutes founded by the Wilhelm Gesellschaft in Germany are given as examples. France has no corresponding institution, and after a full discussion of the questions of control, staff, and work to be done, the following resolution was unanimously carried:—"The Academy of Sciences, convinced of the necessity of organising in France, in a systematic manner, certain scientific researches, expresses its wish that a National Physical Laboratory should be started, for the prosecution of scientific researches useful to the progress of industry. As in other countries, this laboratory would be placed under the control and direction of the Academy of Sciences." On November 27 this question was further considered by the academy, and it was suggested that the general direction of the laboratory should be entrusted to a council, one-half of the members to be nominated by the academy, one-quarter representatives of the State departments, and the remaining quarter delegated by the principal industrial interests. Certain existing State laboratories might be affiliated to the National Laboratory. A considerable grant for establishment and maintenance will be necessary.

A PROLONGED trial, which has lasted 145 days, the longest British trial with the exception of the Tichborne case, and concluded with the longest speech on record in the British Bar, illustrates the inconvenience of the adoption by Rhodesia, under the influence of Mr. Hayes Hammond of the American mining law. According to that system, instead of each mining company holding all the minerals vertically below its surface, it has the right to work under its neighbours' lands any reef that it can follow from the surface. In this case the Globe and Phœnix Gold Mining Co. was extracting very rich ore from beneath the surface held by the Amalgamated Properties of Rhodesia. The question at issue was whether this ore was part of the Phœnix reef, in which case it belonged to the Globe and Phœnix Co. by virtue of its extralateral rights, or whether it came from an independent reef. The Phœnix mine at the surface worked two parallel reefs, which came together underground, and at greater depths bifurcated several times. The Globe and Phœnix Co. claimed these bifurcations as branches of one reef. According to the plaintiff company there are no branching reefs, and the alleged Phœnix reef consists of at least five independent reefs which had been brought into practical continuity by a complex series of faults. It was claimed that the so-called coalescences and bifurcations were junctions due to faults, and that the great variations in the ore indicated that different parts of the reef had been formed at different times and by different processes, and were therefore distinct reefs. The geological evidence was subject to the drawbacks that the reef had been long ago removed at the critical junctions, and that the evidence collected by the survey of the fifteen miles of underground workings was in places inadequate, as it was not always realised what would be the essential points. The Globe and Phœnix Co. admitted that the reef was not formed in a short time and all parts of it simultaneously, as it probably grew by the slow extension of a branching system of cracks. Mr. Justice Eve's decision in favour of the Globe and Phœnix Co. therefore decides that such a slowly formed branched sheet of ore, in spite of considerable variations in its contents and some breaks in its continuity, is one reef.

WE much regret to announce the death, on December 10, of Mr. Clement Reid, F.R.S., late of H.M. Geological Survey, at sixty-three years of age.

WE regret to record the death on December 11, in his eighty-ninth year, of Mr. W. Ellis, F.R.S., formerly superintendent of the magnetical and meteorological department, Royal Observatory, Greenwich.

MR. RANSOM, of Hitchin, has placed with the Pharmaceutical Society funds to endow a research fellowship to bear his name. The sum to be invested for the purpose will yield about 100*l.* yearly in perpetuity.

THE Primate of Ireland (Dr. Crozier), in whom the appointment is vested, subject to the approval of Oxford University, has appointed Mr. J. A. Hardcastle, a grandson of Sir John Herschel, to be astronomer to the Armagh Observatory in succession to Dr. J. E. L. Dreyer, who recently resigned to take up work at Oxford.

THE "Cecil" medal and prize of 10*l.* is offered by the Dorset Field Club for award in May next, for the best paper on "The more recent applications of electricity in the present war, especially in the treatment of wounds and diseases arising therefrom." The competition is open to persons of from seventeen to thirty-five years of age, born in Dorset, or resident in the county for a year between May 1, 1915, and May 1, 1917. Competing essays should be sent to Mr. H. Pouncy, the *Chronicle* Office, Dorchester.

THE death is announced, in his ninetieth year, of the Rev. W. D. Macray, librarian, historian, and archæologist, whose life was spent in the service of the Bodleian Library. His first work was a manual of British historians down to A.D. 1600, but the main study of his life was bibliography, as shown by the catalogue of the Bodleian Library, and "The Annals of the Bodleian," published in 1868. He also edited works for the Rolls Series, and prepared a calendar of the muniments of Magdalen College. He was in charge of Ducklington parish for more than forty years.

PROF. A. S. UNDERWOOD, who died on December 2, occupied the chair of dental anatomy and physiology at King's College Hospital for twenty-two years, and became inspector of dental examinations on behalf of the General Medical Council. He had also been president of the Odontological Society, and held several other offices in connection with dental science. He was born in London on January 10, 1854, and throughout his professional career did much to encourage research among those who were engaged in practice. He himself was successively interested in the production of dental caries by the action of micro-organisms, the detection of organic matter in human enamel, and the anatomy of the maxillary sinus. In 1912 he took part in the restoration of the lower jaw of Piltdown man, and in 1913 he published an X-ray photograph of this fossil, which was discussed at the time in NATURE.

THE death is announced of Dr. José Echegaray, member of the Spanish Academy, and president of the Spanish Academy of Sciences. Born at Madrid on April 19, 1832, he began early to incline to mathematical studies, and in 1854 he was appointed professor in the School of Bridges and Roads. From that time onwards his activities widened, and he gradually became one of the prime movers in the modern revival of science and other intellectual studies in Spain. His numerous popular articles on scientific subjects in the magazines and reviews were especially attractive, and aroused great interest. He was also a poet and author of plays, and in 1904 he shared with Mistral the Nobel prize for poetry. In 1905, when already seventy-three years old, Dr. Echegaray was called to the professorship of physics in the University of Madrid; he then began with renewed energy to promote the study of mathematics, and was occupied with the proof sheets of his last work, in several volumes, at the time of his death on September 14, 1916. Between 1868 and 1874 Dr. Echegaray took a prominent part in political life, and while Minister of Public Works, Instruction, and Agriculture founded the Spanish Geographical and Statistical Institute.

THE August issue of "Records of the Geological Survey of India," which reached us a few days ago, includes the following note by the director of the survey, Dr. H. H. Hayden, upon Mr. R. C. Burton, who died of wounds on April 9, at twenty-six years of age:—"I greatly regret to have to record the death of Mr. R. C. Burton, assistant superintendent, Geological Survey of India. Mr. Burton joined the department in January, 1912, and was posted to the Central Provinces, where, during his short period of service, he did admirable work in helping to solve the question of the origin of the calcareous gneisses which constitute such an important element of the Archæan group of that area. His investigations into the origin of the bauxite of Seoni and adjoining districts also gave evidence of marked ability, and by his death the Geological Survey has lost one of the most promising, as well as one of the most popular, of its younger members. Mr. Burton joined the Indian Army Reserve of Officers early in April, 1915, and, after a short training in India, was attached to the 104th Rifles in Mesopotamia, where he died on April 9 from wounds received in action on the previous day. His loss is keenly felt by all his colleagues."

We regret to announce the death of Sir James B. Lyall, K.C.S.I., G.C.I.E., an ex-Lieutenant Governor of the Punjab, and younger brother of the late Sir Alfred Lyall. Both brothers were educated at Eton and Haileybury College, and through the influence of an uncle, a director of the East India Company, obtained appointments in the Indian Civil Service. The career of Sir James Lyall was spent in the Punjab, where he held in succession the posts of Settlement Officer of Kangra and Financial Commissioner, succeeding Sir Charles Aitcheson in 1887 as Lieutenant-Governor of the province. He did not possess the learning and literary skill of his brother, Sir Alfred Lyall; but his Settlement report of Kangra threw much light on the customs and sociology of the Hindus occupying the hill districts. His most important work of administration was the scheme for the Chenab Canal irrigation project, which brought a large area of waste land under the plough, and gave welcome relief to the more congested districts. After his retirement from the Service he was a member of the Opium and the Famine Commissions. Few men who have risen to the highest posts have been more universally esteemed by Indians and by their own countrymen, and few have displayed more constant kindliness and courtesy, combined with frankness and strength of character.

The death is announced, in his eighty-sixth year, of Dr. Richard Norris, formerly professor of physiology in Queen's College, Birmingham. From an obituary notice in the *British Medical Journal* we gather the following particulars of his career. During the 'fifties of last century Norris made his first important discovery—the photographic dry plate. In 1862 he made his first contribution to the Royal Society, "Phenomena of Attraction and Adhesion in Solid Bodies, Films, Vesicles, Liquids, Globules, and Blood Corpuscles." In the same year he was appointed professor of physiology in his old medical school, a position he continued to hold until the absorption of Queen's College by the Mason College, now the medical faculty of the University of Birmingham. During the next few years he contributed papers to the Royal Society, chiefly on physiological subjects, with, however, one on "Certain Molecular Changes in Iron and Steel during Separate Acts of Heating and Cooling." At the meeting of the British Association in 1865 he read a paper demonstrating that the opinion then held that muscular contraction caused rigor mortis was fallacious. But what he regarded as his chief work was the discovery in 1877 of large numbers of "invisible corpuscles" in the blood. In 1882 Prof. Bizzozero, of Turin, claimed to have seen similar corpuscles, but Dr. Norris easily established priority. He maintained that these corpuscles were invisible in that they possessed the same refractive index as the liquor sanguinis. Later his contentions were challenged, but he maintained his own views.

Dr. Peter Quin Keegan, who died on August 10 at Patterdale, in Westmorland, where he had lived for many years, was keenly interested in the colouring matters in leaves and flowers, and published notes on the subject in various journals. In Nature (vol. lxi., 1899) he described the results of some "Experiments on Floral Colours," indicating the effect of acids, alkalis, and salts on the anthocyanins of various flowers, and later, in Nature (vol. lxix., 1903), discussed the relation between leaf decay, or loss of vitality in the leaf, and the appearance of autumn tints. He explained the greater brilliance of the American autumn tints as compared with those in England by the greater vitality of the leaf induced by the favourable conditions of the Indian summer, which favoured "the normal process of deassimilation (the development of coloured pigment from tannic chromogen)." He contributed notes on the same subject to the *Naturalist*, and also notes on the chemical analyses of some common plants. He approached the subject from a chemist's point of view, and does not seem to have been fully cognisant of the results of other workers nor to have appreciated the diversity of factors involved from the physiological point of view. In the *Naturalist* (1910, p. 226; see also *Knowledge*, 1911, p. 15) he summarised the results of his investigations on the colour of flowers thus: the production of pigment in the petal is a purely local action due to a process of deassimilation set up to supply the insistent demand for proteid for the development of pistil and ovules, whence he argued that, other conditions being equal, "those floral organs which habitually produce most ovules ought to exhibit the most vividly tinctured corollas."

Dr. Rowland Norris has compared two methods for the preparation of anti-anthrax and other serums. In one the blood from the immunised animal is defibrinated by shaking with a coil of wire and then centrifuged; in the other the blood is mixed with potassium oxalate solution, which prevents coagulation, sedimented, and centrifuged; the plasma is then clotted by the addition of calcium chloride solution, and the serum separated. It is found that the oxalate method gives a much greater yield of serum, which is also clearer and of a better colour (Bull. 60, Agricultural Research Institute, Pusa).

The meningococcus, the micro-organism of cerebrospinal fever, frequently persists in the throat of "carriers" for long periods. Lieut.-Col. Gordon and Capt. Flack have tested the effect of sprays containing chloroamine T and zinc sulphate for freeing carriers from the meningococcus. When the infection is scanty both agents are generally quickly effectual, but when the infection is abundant the condition is far more difficult to "cure" and chloroamine only is of use (*British Medical Journal*, 1916, November 18, p. 673).

Miss L. H. Hine, in a paper on "The Bionomics of the Tiger-Beetle" (Proc. R. Phys. Soc. Edin., xx., part 1), describes for the first time the egg-laying habits of *Cicindela campestris*. The female insect bores into the soil with her ovipositor to a depth of 4 or 5 mm. "As the hole deepened, the beetle raised herself on her front legs till her body assumed an almost perpendicular attitude." The hole is afterwards filled up and the surface carefully raked over.

An interesting divergence from the normal feeding habit of its family—the Cecidomyidæ, or gall-midges—is shown by the larva of an American fly, *Aphidoletes meridionalis*; instead of eating and deforming plant-tissues it attacks and devours aphids or "greenfly" on such diverse plants as garden pea, oats, and fruit-trees. A fresh account of the life-history and habits, with figures of the various stages, has lately been published by J. J. Davis (*Journ. Agric. Research*, vi., No. 23).

Drs. Raymond Pearl and M. R. Curtis continue their "Studies on the Physiology of Reproduction in the Domestic Fowl" with a memoir on "Dwarf Eggs" (*Journ. Agric. Research*, vol. vi., No. 25). In a period of eight years nearly 300 dwarf eggs were examined at the Maine Station—one "dwarf" to 1158 normal eggs. At least 65 per cent. of those studied "were initiated by an abnormal small yolk or by a part of a normal yolk." About a third of the shells proved yolkless; such "eggs" may be formed through "the stimulation of an active duct by some particle which is not yolk."

THE *American Museums Journal* for October contains an exceedingly interesting article on the common mussel (*Mytilus edulis*), primarily intended to awaken the American public to the fact that in this mollusc they have a source of most nutritious food, which has the further advantage of being practically inexhaustible, vast beds extending along much of the Atlantic seaboard. In his general survey of the life-history of this mollusc, the author, Mr. Irving Field, points out that the ill-effects of overcrowding are at least mitigated by the power of migration which, to a limited extent, even the adults possess in the sucker-like action of the foot. This activity is much more marked in young specimens, which, timed over a measured course, have attained a speed of one inch per minute. At this stage they can creep with ease up the vertical faces of piles and rocks. Further, they have been observed, like pond-snails, to creep along under the surface-film of still water. The almost incredible fecundity of this mollusc, and the number of its enemies, which is surprising, are also fully enlarged upon.

THE forty-ninth annual report of the Fisheries Branch of the Canadian Naval Service, published this year, deals mostly with statistics of the fishery industries of the Dominion and with reports of surveys and inspections. One appendix gives an account of the rather extensive operations of the fish hatcheries in relation to the fresh-water fishes of the great lakes and rivers. Other appendices deal very briefly with the work of the biological stations at St. Andrews, in New Brunswick, and at Departure Bay, in British Columbia. Preliminary notices are made of some highly interesting investigations on the processes involved in the operations of fish-curing, and on the biochemistry of the extractives of cured fish and the organic fluids of various fresh fishes and other marine animals. Other fishery investigations are in progress, and their publication will be a matter of much interest.

THE observations on the sound of gun-firing in the south-eastern counties of England are collected and analysed in an interesting paper by Messrs. M. Christy and W. Marriott (Quart. Journ. Roy. Meteor. Soc., vol xlii., October, 1916, pp. 267–88). Mr. Christy's observations were made at Chignal St. James, near Chelmsford, which is about 125 miles from Ypres and 155 miles from Albert. The sounds which are attributed to firing in the neighbourhood of Ypres consisted of a rapid succession of dull thuds, almost more felt than heard. Those heard on June 24 last and afterwards, from the valley of the Somme, were more intense and so rapid that they formed a fluttering rumble. The sounds have been recorded from nearly the whole of Essex, Kent, Surrey, and Sussex, and from parts of the adjoining counties. The firing near Ypres was heard at Elmdon, in north-west Essex (about 151 miles), and that in the Somme Valley near Winchester and Ringwood, in Hampshire (about 200 miles), and at Wendling, in Norfolk (about 220 miles). Mr. Christy's observations show that the sounds were heard more readily the greater the elevation; in valleys they were seldom noticed. Their audibility also varies with the season. In the spring and summer they were heard nearly every day, in the early autumn very rarely, and never in the winter months. The meteorological conditions that favour the transmission of the sound are discussed by Mr. Marriott. He finds that the sounds were heard most frequently on days when there was a light or moderate breeze from between north and east, and when the sky was cloudy or overcast.

THE climate of Hongkong has recently been discussed by Mr. T. F. Claxton, director of the Royal Observatory, Hongkong. The observatory is not on the island, but is situated near the centre of Kowloon, a small peninsula in South China, separated from Hongkong by a harbour from one to three miles wide. Mean monthly diurnal inequalities are given of the principal meteorological elements, and the times of day at which different temperatures and wind velocities will occur on the average throughout the year. Numerous plates are given showing diurnal ranges of barometer, temperature, rain, cloud, and sunshine, and vector diagrams of wind are also given. At the commencement of the discussion five-day means are given of the principal meteorological elements throughout the year for the period of thirty years, 1884–1913; these values are also given graphically. The four seasons of the year are shown to be well marked in Hongkong. A comparatively cold, dry winter lasts from the beginning of December to the middle of March, followed by a damp, misty spring until May, and a hot summer from June to September, with occasional heavy rain from typhoons which pass mostly to the north and north-west of the observatory. The autumn is usually dry and pleasant. The typhoons are discussed, and especially their influence on the weather at Hongkong and on the basing of weather forecasts from their bearing and distance. Special attention is also given to the effect of variations in the solar activity on the meteorological elements. Greater details would be welcomed on some points; for instance, it is scarcely possible to obtain the recognised reduced barometer readings. The building of the observatory is said to be 103 ft. above sea-level, but the height of the barometer is not given, and clearly most of the readings are uncorrected for height. No mention is made of the correction for gravity.

THE Canadian Arctic Expedition under Mr. V. Stefansson is still at work, and only brief accounts of its progress have so far appeared in the Press. Some further details of the work of the expedition up to the autumn of 1915 now appear in the report of the Department of the Naval Service of Canada for the year ending March 31, 1916. Last year's issue of this publication contained the story of the drift and loss of the *Karluk* and the subsequent rescue of the greater part of her crew. The present volume has better news. In the summer of 1915 Mr. Stefansson, with three companions, explored and charted the west coast of Prince Patrick Island. At Cape McClintock they found one of McClintock's records from 1853. In 78° N. lat. 117° W. long. new land was sighted to the north. They reached this land and explored some miles of its coast-line, but the weather was unfavourable. However, there can be no doubt that this new island in Gustav Adolf Sea is one of considerable size. It seems to be connected with Prince Patrick Island by a chain of small islands or reefs. A further result of the expedition's work is the certainty of the absence of land in the Beaufort Sea, north of the Mackenzie River and west of Banks Land. The continental shelf extends fifty miles beyond Alaska and Banks Land, where the water rapidly deepens to more than 1300 fathoms.

VERY little attention seems to have been paid to the question of the mobility of iron in plants, probably because this element has ordinarily been considered of minor interest in plant nutrition. Pfeffer states that iron, like potassium and phosphorus, may be removed from the older dying organs and transferred to new growth. This view is challenged by Messrs. P. L. Gile and J. O. Carrero, of the Porto Rico Experiment Station, in the *Journal of Agricultural Research*, vol. vii., No. 2. Working with rice plants grown normally in water culture and then transferred to iron-free culture solutions, these experimenters find that chlorosis is invariably noticed first in the new leaves, while the old leaves remain green, the plants dying from the top downwards. If iron were mobile in the plants after reaching the leaves, the phenomena should be different; iron should be transferred from the old to the new leaves, where growth is most active, and the old leaves become chlorotic first. Analyses of the ash from old and new leaves of young rough-lemon trees (*Citrus limonum*), grown in four different soils, show that the percentage of iron in the old is almost twice that in the young leaves. The authors carefully avoid any claim that the non-translocation of iron is a general rule for all plants, since their experiments were chiefly made with rice and pineapples. They suggest, however, that in respect to mobility in the plant iron should be grouped with silicon and calcium, and not with nitrogen, phosphorus, potassium, and magnesium, which are generally considered mobile.

The current number (December, 1916) of the *School World* contains an interesting account by Canon J. M. Wilson of a thirteenth-century MS. in the Worcester Cathedral Library. Written in Latin, it is the translation of an Arabic text containing the definitions, postulates, and axioms of Euclid's "Elements," Book I., together with a rhetorical abstract of props. 1–20. There are no figures, and, what is still more remarkable, there are no symbols for points. Thus, in English, the summary of prop. 1 is:—"To describe an equilateral triangle on a given straight line. From the two extremities of the given line, setting off its length with the compass, describe two intersecting circles. Then from the common point of the circles draw straight lines to the extremities of the given line. Then deduce the proof from the definition of a circle." One of the greatest of modern works on pure geometry is v. Staudt's "Geometrie der Lage"; here there are no figures, but the author uses symbols for points, planes, and lines. In its absence of symbols for elements, as well as its omission of figures, this geometrical fragment is very peculiar, and possibly unique. Canon Wilson says that there is room for figures on the margin, but he does not say whether any special spaces are reserved for them. Judging from the facsimile (p. 448), we should say that there were not. It may be added that the assumption used in the theory of parallels appears as a postulate and not as an axiom.

In his repetition of Fizeau's experiment on the drag exercised by moving matter on the ether, Prof. Zeeman used water flowing with a mean speed of about 500 centimetres a second through two parallel tubes 300 centimetres in length and 2 centimetres in diameter. As the two beams of light traversing the tubes pass along their axes it is necessary to know the speed of the water along the axes. In the first instance Prof. Zeeman calculated this speed from the mean speed as given by a water meter, but more recently, according to two communications made to the Academy of Sciences of Amsterdam, which appear in vols. xviii. and xix. of their Proceedings, he has measured the axial speed directly. His method depends on the observation of small air-bubbles introduced into the stream and illuminated by a narrow beam of light sent along the axis of the tube. These bubbles are viewed through windows in the side of the tube by reflection in a mirror rotating rapidly about an axis parallel to the tube. The slope of the line of bubbles as seen in the mirror gives their speed if the angular speed of the mirror is known. He finds that the mean speed in his short pipes is 0·844 of the speed at the axis, while, according to the measurements of Stanton and Pannell at the National Physical Laboratory, the mean is 0·82 of the axial speed for water moving at the same speed in long pipes of this diameter.

Messrs. Constable and Co., Ltd., announce the early publication of a translation, by J. H. Johnson, of Jean Rey's "The Range of Electric Searchlight Projectors." The work will embody the investigations and tests carried out by the author in various parts of the world under actual working conditions. It will contain a number of diagrammatic illustrations.

To those who are interested in Russia, Catalogue No. 370, just issued by Mr. F. Edwards, 83 High Street, Marylebone, should appeal, for it is largely composed of particulars of works relating to the Russian Empire. Another section deals with books concerning the United States, Canada, the West Indies, Central and South America, and a third with those on the western counties of England.

OUR ASTRONOMICAL COLUMN.

The Longitude of Washington.—The first direct determination of the longitude of Washington, referred to Paris, has lately been made by American and French astronomers with the aid of wireless signals between the Eiffel Tower and the naval station at Radio, Va. Full details of the extensive observations are given in Appendix to Publications of the U.S. Naval Observatory, second series, vol. ix. The antennæ at the two stations were adapted for the use of practically the same fundamental wave-length, namely, 2150 metres. Notwithstanding the great distance of 3840 miles between the two stations, the signals received at Paris are stated to have been very clear, though those received at Radio were rather feeble. The final result Washington–Paris is given as 5h. 17m. 36·653s. ±0·0031s.; and for Washington–Greenwich as 5h. 8m. 15·721s. ±0·014s. The value of the latter previously derived by the U.S. Coast and Geodetic Survey, and quoted in the Nautical Almanac, was 5h. 8m. 15·78s. It is interesting to observe that the mean double-transmission time was 0·0429s. ±0·0029s., corresponding to a velocity of transmission of 179,000 ± 12,000 miles per second.

A number of American observatories also made arrangements to receive the time signals from Radio and to utilise them for determinations of their longitudes from Washington.

The Variable Nebula N.G.C. 2261.—Another case of a nebula of variable form has been found by E. P. Hubble in N.G.C. 2261 (*Astrophysical Journal*, vol. xliv., p. 190). The nebula in question is the finest known example of the rare "cometic" type, and is situated in R.A. 6h. 32m., declination +8° 51′. Its form is nearly that of an equilateral triangle with a sharp stellar nucleus at the extreme southern point, this nucleus forming the irregular variable star R Monocerotis. A photograph taken during last winter by Mr. Hubble with the 24-in. reflector of the Yerkes Observatory showed decided changes in the nebula when compared with a plate taken eight years earlier by F. C. Jordan with the same instrument. Confirmation of the variability was found in a photograph taken by Isaac Roberts in 1900, and in